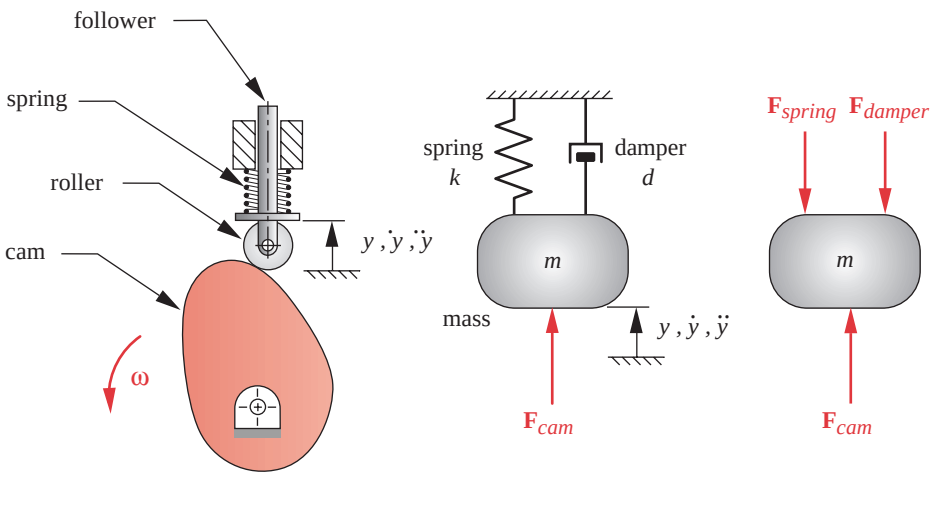

(*a*) Actual system (*b*) Lumped model (*c*) Free-body diagram

FIGURE 3-15

Lumped Model of a Cam-Follower Dynamic System

connected to ground through a single spring and a single damper. All the moving mass in the system (follower, spring) is contained in m and all the "spring" including the physical spring and the springiness of all other parts is lumped in the effective spring constant k.

SPRING CONSTANT A spring constant k is an assumed linear relationship between the force, F, applied to an element and its resulting deflection δ (see Figure 3-17):

$$k = \frac{F}{\delta} \tag{3.5a}$$

If an expression for the deflection of an element can be found or derived, it will provide this spring-constant relationship. This topic is revisited in the next chapter. In the example of Figure 3-15, the spring deflection δ is equal to the displacement y of the mass.

$$k = \frac{F}{y} \tag{3.5b}$$

DAMPING All the damping, or frictional, losses are lumped in the damping coefficient d. For this simple model, damping is assumed to be inversely proportional to the velocity y_{dot} of the mass.

$$d = \frac{F}{\dot{y}} \tag{3.6}$$